Safety technique

Emergency Stop Module BG 5925
safemaster

• According to EU directive for machines 98/37/EG
• According to IEC/EN 60204-1, VDE 0113 part 1 (1998-11)
• Safety category 4 according to EN 954-1
• Output: max. 3 NO contacts, see contacts
• Single and 2-channel operation
• Line fault detection on On-button
• Manual restart or automatic restart when connecting the supply voltage, switch S2
• With or without cross fault monitoring in the E-stop loop, switch S1
• LED indicator for state of operation
• LED indicator for channel 1 and 2
• Removable terminal strips
• Wire connection: also 2 x 1,5 mm² stranded ferruled (isolated), DIN 46 228-1/-2/-3/-4 or 2 x 2,5 mm² stranded ferruled DIN 46 228-1/-2/-3
• Width 22.5 mm

Function diagram

Block diagram

Approvals and marking

Applications

Protection of people and machines
• Emergency stop circuits on machines
• Monitoring of safety gates
• Control unit for lightbars

Indicators

upper LED: on when supply connected
lower LEDs: on when relay K1 and K2 energized

Notes

The category of a safety relevant part of a control circuit according to EN 954-1 can be different to the category 4 of the E-stop module BG 5925 depending on the external connections.

Line fault detection on On-button:
The line fault detection is only active when S12 and S22 are switched simultaneously. If the On-button is closed before S12, S22 is connected to voltage (also when line fault across On-Button), the output contacts will not close.

A line fault across the On-button which occurred after activation of the relay, will be detected with the next activation and the output contacts will not close. If a line fault occurs after the voltage has been connected to S12, S22, the unit will be activated because this line fault is similar to the normal On-function. The gold plated contacts of the BG 5925 mean that this module is also suitable for switching small loads of 1 mVA - 7 VA, 1 mW - 7 W in the range 0,1 - 60 V, 1 - 300 mA. The contacts also permit the maximum switching current. However since the gold plating will be burnt off at this current level, the device is no longer suitable for switching small loads after this.

The terminal S21 permits the operation of the device in IT-systems with insulation monitoring, serves as a reference point for testing the control voltage and is used to connect the E-stop loop when cross fault monitoring is selected.

Circuit diagrams

BG 5925.22  BG 5925.16  BG 5925.03  BG 5925.02

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements and changes at any time.
Unit programming

Notes
Connecting the terminal S21 to the protective ground bridges the internal short-circuit protection of Line A2 (−). The short-circuit protection of line A1 (+) remains active.
To alter the functions automatic start - manual start and with or without cross fault monitoring, the switches S1 and S2 are used. These are located behind the front cover (see unit programming).
The setting with or without cross fault monitoring on E-stop buttons is made with S1. S2 is used to change between automatic and manual restart. On automatic start also the terminals S33 - S34 have to be linked. For connection please see application examples.

ATTENTION - AUTOMATIC START!
According to IEC/EN 60 204-1 part 9.2.5.4.2 and 10.8.3 it is not allowed to restart automatically after emergency stop. Therefore the machine control has to disable the automatic start after emergency stop.

Technical data

Input circuit
Nominal Voltage Uₙ:
DC 24 V, AC/DC 24 V
AC 230 V with variant /105 and /106

Voltage range
at 10% residual ripple: 0,9 ... 1,1 Uₙ 0,95 ... 1,1 Uₙ
at 48% Residual ripple: 0,8 ... 1,1 Uₙ 0,8 ... 1,1 Uₙ
AC: — 0,85 ... 1,1 Uₙ

Nominal consumption:
DC approx. 2 W

Min. Off-time:
250 ms

Control voltage on S11:
DC 23 V at Uₙ

Control current over S12, S22:
40 mA at Uₙ

Min. voltage between terminals S12, S22 and S21:
DC 21 V when relay activated and Uₙ on A1 - A2

Short-circuit protection:
Internal PTC

Overvoltage protection:
Internal VDR

Output

Contacts
BG 5925.02:
2 NO contacts
BG 5925.03:
3 NO contact
BG 5925.16:
1 NO, 1 NC contact
BG 5925.22:
2 NO, 1 NC contact

ATTENTION! The NC contacts are safety contacts.

Operate delay typ. at Uₙ:
Manual start:
40 ms
automatic start:
BG 5925._/101:
250 ms
Release delay typ. at Uₙ:
Disconnecting the supply:
50 ms
Disconnecting S12, S22:
15 ms

Contact type:
positive guided

Nominal output voltage:
AC 250 V
DC: see limit curve for arc-free operation

Disconnect unit before setting of S1
Drawing shows setting at the state of delivery

Technical data

Switching of low loads:
≥ 100 mV
≥ 1 mA

Thermal current Iₜ:
see current limit curve
max. 8 A
max. 7 A per contact path

Switching capacity

Switching to AC 15:
AC 3 A / 230 V IEC/EN 60 947-5-1
for NO contacts
AC 2 A / 230 V IEC/EN 60 947-5-1
for NC contacts
to DC 13:
DC 2 A / 24 V IEC/EN 60 947-5-1
for NC contacts

Permissible operating frequency:
Short circuit strength
max. fuse rating:
line circuit breaker:
C 8 A

Mechanical life:
10 x 10⁵ switching cycles

Electrical contact life

to AC 15 at 2 A, AC 230 V: 10⁶ switching cycles
IEC/EN 60 947-5-1
> 1,5 x 10⁶ switching cycles

to DC 13:
8 A / 24 V > 10⁶
ON: 0,4 s, OFF: 9,6 s

Overvoltage category / contamination level:
4 kV / 2 IEC 60 664-1

EMC
Electrostatic discharge:
8 kV (air) IEC/EN 61 000-4-2
HF irradiation:
10 V / m IEC/EN 61 000-4-3
Fast transients:
2 kV IEC/EN 60 060-4-4

Surge voltages between wires for power supply:
1 kV IEC/EN 60 060-4-5
between wire and ground:
2 kV IEC/EN 60 060-4-5
Interference suppression:
Limit value class B IEC 61 055-011

Degree of protection:
Housing: IP 40 IEC/EN 60 529
Terminals: IP 20 IEC/EN 60 529

General data
Operating mode:
Continuous operation
Temperature range:
- 15 ... + 55 °C
Clearance and creepage distances
Overvoltage category / contamination level:
4 kV / 2 IEC 60 664-1

Housing:
Thermoplastic with V0 behaviour according to UL subject 94

Vibration resistance:
Amplitude 0,35 mm IEC/EN 60 068-2-6
frequency 10 ... 55 Hz
Climate resistance:
15 / 055 / 04 IEC/EN 60 068-1

Terminals designation:
EN 50 005

Wire connection:
1 x 4 mm² solid or
1 x 2,5 mm² stranded ferruled (isolated)
or
2 x 1,5 mm² stranded ferruled (isolated)
DIN 46 228-1/-2/-3/-4 or
2 x 2,5 mm² stranded ferruled
DIN 46 228-1/-2/-3

Contact type:
positive guided

Nominal output voltage:
AC 250 V
DC: see limit curve for arc-free operation

Notes
ATTENTION! The NC contacts 21-22 or 31-32 can only be used for monitoring.

ATTENTION - AUTOMATIC START!
According to IEC/EN 60 204-1 part 9.2.5.4.2 and 10.8.3 it is not allowed to restart automatically after emergency stop. Therefore the machine control has to disable the automatic start after emergency stop.
Technical data

Wire fixing: Box terminal with wire protection, removable terminal strips
Mounting: DIN rail IEC/EN 60 715
Weight: 220 g

Dimensions

Width x height x depth: 22.5 x 84 x 121 mm

Standard type

BG 5925.03 AC/DC 24 V
Article number: 0049169
• Output: 3 NO contacts
• Nominal voltage U_n: AC / DC 24 V
• Width: 22.5 mm

Variants

BG 5925._._/60: CSA/UL approval
BG 5925._._/101: E-stop with fast automatic start without line fault detection on the ON-button
BG 5925._._/105: With switch S1 and without crossfault monitoring for AC 230 V
BG 5925._._/106: With switch S2 and with cross fault monitoring for AC 230 V
BG 5925.02/113: Manual restart, with cross fault monitoring for DC 24 V
Switching capacity to AC 15: 5 A / 230 V
Contact fuse 6 A fast / 4 A slow without internal switches S1 and S2
BG 5925.02/114: Automatic restart, with cross fault monitoring for DC 24 V
Switching capacity to AC 15: 5 A / 230 V
Contact fuse 6 A fast / 4 A slow without internal switches S1 and S2

Ordering example for Variants

BG 5925._._/DC 24 V
Nominal voltage
Variant, if required
Contacts
Type

Characteristics

Quadratic total current limit curve

Arc limit curve under resistive load

Switching current I[A]

safe breaking, no continuous arcing under the curve, max. 1 switching cycle/s

Switching voltage U [V]

0 50 100 150 200 250

0 1 2 3 4 5 6 7 8

147 A' max

0 160 140 120 100 80 60 40 20

0 10 20 30 40 50 60 70 80

Quadratic total current

I' = I_1 + I_2 + I_3

I_1, I_2, I_3 - current in contact paths

Contact service life

Switching current I [A]

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

0 1 2 3 4 5 6 7 8

I [A]

electric life DC13 24V DC / t_on 0,4s; t_off 9,6s
2 contacts in series
Application examples

2-channel safety gate monitoring.

Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start

Contact reinforcement by external contactors, 2-channel controlled.

Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start

2-channel emergency stop circuit with cross fault monitoring.

Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start

Contact reinforcement by external contactors controlled by one contact path.

Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start

2-channel emergency stop circuit without cross fault monitoring.

Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start

Single channel emergency stop circuit. This circuit does not have any redundancy in the emergency-stop control circuit.

Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start

Contact reinforcement by external contactors, 2-channel controlled. The output contacts can be reinforced by external contactors with positive guided contacts for switching currents > 8 A. Functioning of the external contactors is monitored by looping the NC contacts into the closing circuit (terminals S33-S34).

Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start

2-channel emergency stop circuit with cross fault detection

Note: Refer to "Unit programming"!
Switches in pos.: S1 cross fault detection
S2 manual start

2-channel emergency stop circuit.

Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start

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